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Hisada et al.

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(54) **ROTATING PUMPING APPARATUS WITH SEAL MECHANISM**

(56) **References Cited**

U.S. PATENT DOCUMENTS

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Kariya, Aichi-pref. (JP)

2,876,025	A *	3/1959	Orloff et al.	277/459
3,738,665	A *	6/1973	Bilco	277/558
4,284,280	A *	8/1981	Bertram et al.	277/558
4,325,557	A *	4/1982	Kawamoto	277/351
5,076,594	A *	12/1991	Baugh	277/615

(Continued)

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FOREIGN PATENT DOCUMENTS

EP	2 530 364	12/2012
JP	2005-030558	2/2005

(Continued)

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OTHER PUBLICATIONS

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(57) **ABSTRACT**

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A rotating pumping apparatus is provided which may be employed in an automotive brake system. The rotating pumping apparatus includes a sealing member and an oil seal which are disposed around a pump drive shaft, and lubricating grease disposed between the oil seal and the pump drive shaft. The sealing member is made up of a resinous ring and a rubber cup. The sealing member has formed therein a labyrinthine flow path which extends from the resinous ring to the rubber cup. The labyrinthine flow path is designed to permit fluid to flow therethrough and create the resistance to flow of the lubricating grease to avoid leakage of the grease outside the sealing member.

(52) **U.S. Cl.**

CPC **F16J 15/3204** (2013.01); **B60T 17/02** (2013.01); **F16J 15/002** (2013.01)

(58) **Field of Classification Search**

CPC F16J 15/002; F16J 15/006; F16J 15/32; B60T 17/02

See application file for complete search history.

10 Claims, 8 Drawing Sheets

